UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,180	03/11/2004	Torsten Niederdrank	P04,0073	5312

7590 04/04/2008

SCHIFF HARDIN LLP
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606

EXAMINER	
OLANIRAN, FATIMAT O	

ART UNIT	PAPER NUMBER
2615	

MAIL DATE	DELIVERY MODE
04/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/798,180	Applicant(s) NIEDERDRANK, TORSTEN	
	Examiner FATIMAT O. OLANIRAN	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 July 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Furthermore, applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-2 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (5463694) in view of Knapp et al. (7324649)

Claim 1 Bradley discloses, a directional microphone system having at least three omnidirectional microphones (col. 3 line 62-65), wherein said at least three omnidirectional microphones are electrically connected in respective pairs to form a first

directional microphone of the first order and a second directional microphone of the first order (col. 5 line 29-34).

Bradley does not disclose a method for automatically equalizing microphone signals said method comprising the steps of: equalizing respective amplitudes of respective microphone signals generated by said omnidirectional microphones; and equalizing respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order by phase shifting the microphone signal generated by at least one of the omnidirectional microphones.

Knapp discloses a method for automatically equalizing microphone signals said method comprising the steps of: equalizing respective amplitudes of respective microphone signals generated by said microphones (col. 1 line 51-65); and equalizing respective amplitudes of respective microphone signals generated by said microphones by phase shifting the microphone signal generated by at least one of the microphones (Fig. 2 and col. 4 line 11-15).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the omnidirectional microphone system of Bradley with the amplitude equalization method of Knapp in order to match the microphone sensitivities.

Claim 2 Bradley further discloses, embodying said directional microphone system in a hearing aid device (col. 7 line 53-54) having a housing (Fig. 5) with at least three sound entrance ports respectively associated with said at least three omnidirectional microphones (Fig. 5 col. 7 line 38-40); and disposing said at least three sound entrance

ports along a substantially straight line and with a same spacing between adjacent sound entrance ports (col. 4 line 60-61).

Claim 11 analyzed with respect to claim 1, Bradley in view of Knapp disclose comprising dividing the omnidirectional microphone signals generated by the respective omnidirectional microphones into frequency bands, and wherein the step of equalizing respective amplitudes of respective microphone signals generated by the omnidirectional microphones comprises compensating respective amplitudes of respective microphone signals generated by the omnidirectional microphones in each frequency band, and wherein the step of compensating respective amplitudes of respective microphone signals generated by the first and second directional microphones of the first order comprises compensating respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order in each of said frequency bands (Knapp; col. 3 line 33-59).

2. Claim 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al (5463694) in view of Knapp et al. (7324649) in further view of Baumhauer Jr. et al (5515445).

Claim 3 analyzed with respect to claim 1, Bradley in view of Knapp disclose wherein each of said omnidirectional microphones has a signal transfer function associated

therewith (inherent, microphones are transducers and therefore have signal transfer functions).

Bradley in view of Knapp do not disclose and wherein the step of equalizing respective amplitudes of respective microphone signals generated by said at least three omnidirectional microphones comprises the steps of: for each of said at least three omnidirectional microphones, measuring a temporal average of acoustic field energy detected by that omnidirectional microphone; and adapting the respective signal transfer functions of the at least three omnidirectional microphones dependent on the temporally averaged acoustic field energy measured for each of said at least three omnidirectional microphones to equalize the temporally averaged acoustic field energy for all of said omnidirectional microphones.

Baumhauer Jr. discloses wherein the step of equalizing respective amplitudes of respective microphone signals generated by said at least three omnidirectional microphones comprises the steps of: for each of said at least three omnidirectional microphones (Fig. 5 microphone array), measuring a temporal average of acoustic field energy detected by that omnidirectional microphone (col. 1 line 54-61); and adapting the respective signal transfer functions of the at least three omnidirectional microphones dependent on the temporally averaged acoustic field energy measured for each of said at least three omnidirectional microphones to equalize the temporally averaged acoustic field energy for all of said omnidirectional microphones (col. 1 line 54-61).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Knapp with the

balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Claim 4 analyzed with respect to claim 3 and claim 1, Baumhauer Jr. further discloses wherein the step of measuring the temporally averaged acoustic field energy (col. 1 line 54-61) comprises, for each of said at least three omnidirectional microphones (Fig. 5 array), measuring a signal level of the microphone signal from that omnidirectional microphone (col. 4 line 10-13).

Claim 5 analyzed with respect to claim 3 Bradley further discloses wherein the step of adjusting the respective signal transfer functions comprises multiplying the respective microphone signals generated by the at least three omnidirectional microphones with respective weighting factors (col. 6 line 26-30).

Claim 6 analyzed with respect to claim 1, Bradley in view of Knapp disclose wherein each of said first and second directional microphones of the first order has a signal transfer function associated therewith (Bradley; col. 5 line 38-43).

Bradley in view of Knapp do not disclose and wherein the step of equalizing respective amplitudes of respective microphone signals generated by said first and second directional microphones of the first order comprises the steps of: for each of said first and second directional microphones of the first order, measuring a temporal average of acoustic field energy detected by that directional microphone of the first order; and

adapting the respective signal transfer function of at least one of the first an second directional microphones of the first order dependent on the temporally averaged acoustic field energy measured for each of said first and second directional microphones of the first order to equalize the temporally averaged acoustic field energy for both of said first and second directional microphones of the first order.

Baumhauer discloses and wherein the step of equalizing respective amplitudes (col. 1 line 54-61) of respective microphone signals generated by said first and second directional microphones of the first order comprises the steps of: for each of said first and second directional microphones of the first order, measuring a temporal average of acoustic field energy detected by that directional microphone of the first order; and adapting the respective signal transfer function of at least one of the first an second directional microphones of the first order dependent on the temporally averaged acoustic field energy measured for each of said first and second directional microphones of the first order to equalize the temporally averaged acoustic field energy for both of said first and second directional microphones of the first order (col. 1 line 54-61).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley with the balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Claim 7 analyzed with respect to claim 6 and claim 1, Bradley in view of Knapp in further view of Baumhauer Jr. discloses wherein the step of measuring the temporally averaged acoustic field energy comprises, for both of said first and second directional microphones of the first order (Bradley; col. 5 line 38-43), measuring a signal level of the microphone signal from that directional microphone of the first order (Baumhauer Jr.; col. 1 line 54-61).

3. Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al. (5463694) in view of Knapp et al (7324649) in further view of Hagen et al. (6389142).

Claim 8 Bradley in view of Knapp disclose wherein said at least three omnidirectional microphones include a first omnidirectional microphone, a second omnidirectional microphone and a third omnidirectional microphone (Bradley; col. 3 line 62-65), and wherein said method comprises the steps of:

electrically connecting said first and second omnidirectional microphones to form said first directional microphone of the first order (Bradley; col. 5 line 29-34);

electrically connecting said second and third microphones to form said second directional microphone of the first order (Bradley; col. 5 line 29-31);

electrically connecting said first and second directional microphones of the first order to form a directional microphone of the second order (Bradley; col. 5 line 35-37) and re-equalizing the respective amplitudes of the first and second directional microphones of

the first order by phase shifting the microphone signal generated by one of said second and third omnidirectional microphones (Knapp Fig. 2 and col. 4 line 17-23).

Bradley in view Knapp do not disclose phase shifting the microphone signal generated by one of the first and second omnidirectional microphones to reduce the amplitude of the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order.

Hagen discloses phase shifting the microphone signal generated by one of the first and second omnidirectional microphones to reduce the amplitude of the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order (col. 5 line 67 and col. 6 line 1-4, "phase delay 54 of the output mic B may be adjusted relative to the output of microphone mic F).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the omnidirectional microphone array of Bradley in view of Knapp with the phase shifter of Hagen in order to vary the polar directivity pattern of the array as taught by Hagen (col. 6 line 6-7).

Claim 9 analyzed with respect to claim 8 and claim 1, Bradley in view of Knapp in further view of Hagen further disclose wherein the step of phase shifting (Hagen; Fig. 4 element 54 and 56) the microphone generated by one of said first and second omnidirectional microphones (Bradley col. 3 line 62-64) comprises phase shifting the

microphone signal generated by one of the first and second omnidirectional microphones within a predetermined range (Hagen; col. 7 line 1-4) to minimize the microphone signal generated by the first directional microphone of the first order with respect to the amplitude of the microphone signal generated by the second directional microphone of the first order (Hagen; col. 5 line 67 and col. 6 line 1-4).

Claim 10 analyzed with respect to claim 8 and claim 1, Bradley in view of Knapp in further view of Hagen further disclose comprising iteratively repeating the phase shifting of the microphone signal generated by one of microphones and the phase shifting of the microphone signal generated by one of the microphones until a predetermined difference between the respective amplitudes of the first and second microphones of the is achieved for successive iterations (Knapp; col. 4 line 39-46).

4. Claim 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bradley et al. (5463694) in view of Knapp et al (7324649) in further view of Baumhauer Jr. et al (5515445).

Claim 12 analyzed with respect to claim 1 Bradley in view of Knapp disclose a directional microphone system comprising:

a first omnidirectional microphone, a second omnidirectional microphone and a third omnidirectional microphone, each of said first, second and third omnidirectional microphones generating a microphone signal having a signal level (Bradley; col. 3 line 62-64); a first pair of said first, second and third omnidirectional microphones being

electrically connected to form a first directional microphone of the first order (Bradley; col. 5 line 29-37); a second, different pair or said first, second and third omnidirectional microphones being electrically connected to form a second directional microphone of the first order (Bradley; col. 5 line 29-37), each of said first and second directional microphones of the first order generating a microphone signal having a signal level (Bradley; col. 5 line 38-40); and a phase control unit connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones (Knapp; col. 3 line 35-59).

Bradley in view of Knapp do not disclose first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones for that measure only the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones;

a plurality of amplitude control units respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units;

fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order for that measure respective levels of the respective microphone signals generated by the first and second directional microphones of the first order;

Baumhauer Jr. discloses first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones (col. 2 line 51-53) that measure only the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones (col. 4 line 10-13); a plurality of amplitude control units (col. 3 line 14-17) respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones, dependent on the respective signal levels measured by said first, second and third level measurement units (col. 4 line 29-32); fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order that measure respective levels of the respective microphone signals generated by the first and second directional microphones of the first order (col. 4 line 10-13).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Knapp with the level measurement of Baumhauer Jr. in order to measure the microphone amplitudes.

Claim 13 analyzed with respect to claim 12 and claim 1, Bradley in view of Knapp in further view of Baumhauer Jr. disclose comprising a plurality of phase control devices for respectively adjusting phases of respective microphone signals generated (Knapp, Fig. 2 col. 4 line 17-24) by at least two of said first, second and third omnidirectional microphones (Bradley; col. 3 line 62-65) dependent on the respective signal levels

measured by said fourth and fifth level measurement devices (Baumhauer Jr; col. 4 line 10-13).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable as being unpatentable over Bradley et al. (5463694) in view of Baumhauer Jr. et al (5515445) in further view of Knapp et al (7324649).

Claim 14 Bradley discloses a housing having first, second and third sound entrance ports a directional microphone system in said housing comprising a first omnidirectional microphone and a second omnidirectional microphone and a third omnidirectional microphone respectively associated with said first, second and third sound entrance ports, each of said first, second and third omnidirectional microphones (col. 3 line 62-64, Fig. 5, col. 7 line 34-38); generating a microphone signal having a signal level, a first pair of said first, second and third omnidirectional microphones being electrically connected to form a first directional microphone of the first order (col. 5 line 29-37), a second, different pair or said first, second and third omnidirectional microphones being electrically connected to form a second directional microphone of the first order (col. 5 line 29-37), each of said first and second directional microphones of the first order generating a microphone signal having a signal level (col. 5 line 38-40).

a signal processor in said housing (Fig. 1:processor 107) that processes the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal (col. 7 line 38-41); and an earphone in said housing for transducing said processed signal to form an acoustic output signal (col. 7 line 54).

Bradley does not disclose first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones that measure the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones, a plurality of amplitude control units respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units, fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order that measure respective levels of the respective microphone signals generated by the first and second directional microphones of the first order, and a phase control unit connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent only on the respective signal levels measured by the fourth and fifth level measurement devices;
a signal processor in said housing for processing the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal; and an earphone in said housing for transducing said processed signal to form an acoustic output signal.

Baumhauer Jr. discloses first, second and third level measurement units respectively connected following said first, second and third omnidirectional microphones that measure the respective signal levels of the microphone signals respectively generated by said first, second and third omnidirectional microphones (col. 4 line 10-13), a plurality

of amplitude control units (col. 3 line 14-17) respectively connected to adjust the amplitudes of at least two of the respective microphone signals from the first, second and third omnidirectional microphones dependent on the respective signal levels measured by said first, second and third level measurement units (col. 4 line 29-32), fourth and fifth level measurement units respectively connected subsequent to said first and second directional microphones of the first order that measure respective levels of the respective microphone signals generated by the first and second directional microphones of the first order (col. 4 line 10-13).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley with the balancing network of Baumhauer Jr. in order to reduce time, cost and labor as taught by Baumhauer Jr. (col. 1 line 19-20 and line 34-35).

Bradley in view of Baumhauer Jr. do not disclose and a phase control unit connected to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent only on the respective signal levels measured by the fourth and fifth level measurement devices;

a signal processor in said housing for processing the respective microphone signals from said first and second directional microphones of the first order to produce a processed signal; and an earphone in said housing for transducing said processed signal to form an acoustic output signal.

Knapp discloses a phase control unit connected (Fig. 2 and col. 3 line 51-59) to adjust a phase of the respective microphone signal generated by at least of said first, second and third omnidirectional microphones dependent only on the respective signal levels; and an earphone in said housing for transducing said processed signal to form an acoustic output signal (inherent).

Therefore it would be obvious to one ordinarily skilled in the art at the time the invention was made to modify the microphone system of Bradley in view of Baumhauer Jr. with the phase control of Knapp in order to have good directivity across a frequency range as taught by Knapp (col. 1 line 46-50).

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure

Dickel et al (6882736)

Weinrich (5201006)

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FATIMAT O. OLANIRAN whose telephone number is (571)270-3437. The examiner can normally be reached on M-F 10:00-6 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FO

/Vivian Chin/

Supervisory Patent Examiner, Art Unit 2615